

Claims

1. A radial reactor for catalytic reaction of gaseous or liquid feed streams comprising

a conventional radial reactor assembly containing a vertical, annular catalyst bed, and

a ring-shaped, vertical layer of material contained within the catalyst bed, wherein the material comprises an active catalyst material contained within a first ring-shaped, vertical layer of the catalyst bed and an inert material contained within a second ring-shaped, vertical layer of the catalyst bed.

2. The radial reactor of Claim 1 wherein the active catalyst material is contained within an outer ring-shaped, vertical layer of the catalyst bed and the inert material is contained within an inner ring-shaped, vertical layer of the catalyst bed.

3. The radial reactor of Claim 1 wherein the layer containing the catalyst material is at least about 4 inches (10 cm) in thickness, when measured radially from a center of the radial reactor.

4. The radial reactor of Claim 1 wherein the layer containing the catalyst material is from about 6 to about 36 inches (15 cm - 90 cm) in thickness, when measured radially from a center of the radial reactor.

5. The radial reactor of Claim 1 wherein the layer containing the catalyst material is from about 6 to about

24 inches (15 cm - 60 cm) in thickness, when measured radially from a center of the radial reactor.

6. The radial reactor of Claim 1 wherein the inert material comprises an alpha alumina, ceramic material or a monolithic structure.

7. The radial reactor of Claim 1 wherein the overall thickness of the ring-shaped, vertical layer of material contained within the radial reactor is at least about 18 inches (45 cm).

8. The radial reactor of Claim 1 wherein the overall thickness of the ring-shaped, vertical layer of material is from about 18 inches (45 cm) to about 48 inches (120 cm).

9. The radial reactor of Claim 1 wherein the active catalyst material comprises a plurality of active catalyst products, at least two of which catalyst products have different performance characteristics.

10. A radial reactor for catalytic reaction of gaseous or liquid feed streams comprising

a conventional, radial reactor assembly containing a vertical annular catalyst bed and

a ring-shaped vertical layer of material contained within the catalyst bed, wherein the material comprises an active catalyst material contained within an outer, ring-shaped, vertical layer of the catalyst bed and an inert material contained within an inner, ring-shaped, vertical layer of the catalyst bed.

11. The radial reactor of Claim 10 wherein the layer containing the catalyst material is at least about 4 inches (10 cm) in thickness, when measured radially from a center of the radial reactor.

5 12. The radial reactor of Claim 10 wherein the layer containing the catalyst material is from about 6 to about 36 inches (15 cm - 90 cm) in thickness, when measured radially from a center of the radial reactor.

10 13. The radial reactor of Claim 10 wherein the inert material comprises an alpha alumina, ceramic material or a monolithic structure.

14. A radial reactor for nonoxidative dehydrogenation of an alkylaromatic feed stream comprising

15 a conventional radial reactor assembly containing a vertical, annular catalyst bed and

a ring-shaped vertical layer of material contained within the catalyst bed, wherein the material comprises a nonoxidative dehydrogenation catalyst contained within a outer, ring-shaped, vertical layer of the catalytic material and an inert material contained within an inner ring-shaped, vertical layer of the catalyst bed.

20 15. The radial reactor of Claim 14 wherein the layer containing the catalyst material is at least about 4 inches (10 cm) in thickness, when measured radially from a center of the radial reactor.

25 16. The radial reactor of Claim 14 wherein the layer

containing the catalyst material is from about 6 to about 36 inches (15 cm - 90 cm) in thickness, when measured radially from a center of the radial reactor.

17. The radial reactor of Claim 14 wherein the inert material comprises an alpha alumina or ceramic material.

18. A process for the nonoxidative dehydrogenation of an alkylaromatic feed stream comprising

passing an alkylaromatic feed stream through a radial reactor, wherein the radial reactor comprises

a conventional radial reactor assembly containing a vertical, annular catalyst bed, and

a ring-shaped vertical layer of material contained within the catalyst bed, wherein the material comprises an alkylaromatic catalyst material contained within an outer ring-shaped, vertical layer of the catalyst bed and an inert material contained within an inner ring-shaped, vertical layer of the catalyst bed.

19. The process of Claim 18 wherein the inert material comprises an alpha alumina or a ceramic material.

20. The process of Claim 18 wherein the vertical, annular catalyst bed is from about 18 inches (45 cm) to about 48 inches (120 cm) in thickness.

21. The process of Claim 18 wherein the inert material comprises a material which neither promotes catalytic reaction nor substantially interferes with the nonoxidative dehydrogenation of the alkylaromatic feed

stream.

22. The process of Claim 18 wherein passage of the alkylaromatic feed stream through the radial reactor results in higher selectivity and activity for the catalyst material contained in the catalyst bed than if the material contained in the catalyst bed comprised solely alkylaromatic catalyst material.

23. The process of Claim 18 wherein the alkylaromatic catalyst material comprises a plurality of alkylaromatic catalyst products, at least two of which products have different performance characteristics.

24. A process for the nonoxidative dehydrogenation of ethylbenzene comprising

passing an ethylbenzene feed stream through a radial reactor, wherein the radial reactor comprises

a conventional radial reactor assembly containing a vertical, annular catalyst bed, and

a ring-shaped vertical layer of material contained within the catalyst bed, wherein the material comprises an ethylbenzene dehydrogenation catalyst contained within an outer, ring-shaped vertical layer of the catalyst bed and an inert material contained within an inner, ring-shaped vertical layer of the catalyst bed.

25. The process of Claim 24 wherein the inert material comprises an alpha alumina, a ceramic material or a monolithic structure.